#### **BROOKHAVEN NATIONAL LABORATORY**

Safety & Health Services Division

#### INDUSTRIAL HYGIENE GROUP

Standard Operating Procedure: Program Procedure

Subject:

Respiratory Fit Testing-QNFT Program Policy & and Principles IH72300

REVISION

FINAL Rev 0

DATE

04/04/02

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#### 1.0 PURPOSE & SCOPE

**Purpose**: This procedure defines the role of the IH group in developing and coordinating an effective respiratory protection **Quantitative Fit Test** (**QNFT**) program. As a minimum, the program will comply with OSHA 29CFR1910.134 (*Respiratory Protection*) and *ANSI Z88.2*. (*American National Standard for Respiratory Protection*). Elements of *ANSI Z88.10* (*Respirator Fit Testing Methods*) are followed as a Best Management Practice. This SOP describe the principles and policies of QNFT and is designed to be used in conjunction with IH72350 (*Operation of the Portacount*<sup>TM</sup> *Plus*) or IH72360 *Operation of the Portacount*<sup>TM</sup>) that describe the operation of a particular fit test apparatus.

#### 2.0 RESPONSIBILITIES

- 2.1 This program is implemented through the SHSD Industrial Hygiene Group Leader and the *Respiratory Protection Program Administrator (RPPA)*. Members of the SHSD Industrial Hygiene Group and other BNL organizations, with qualifications accordance with Section 4 of this procedure, can perform fit testing.
- 2.2 It is the responsibility of persons conducting testing to comply with all provisions in the Respiratory Protection Program Procedure IH72100 and Instrument Operation Procedure IH72350 or IH72360, and IH72450. It is the responsibility of persons conducting testing to document results of the testing in compliance with these SOPs.

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2.3 The IH Group shall maintain the equipment used in this procedure.

#### 3.0 <u>DEFINITIONS</u>

- 3.1 *QNFT- Quantitative Fit Test:* A test in which a challenge agent is administered outside the face piece and the presence of the agent is detected and enumerated by analytical instrumentation. Agents used include corn oil, saccharin, and ambient room dust.
- 3.2 *Portacount* <sup>TM</sup>: A QNFT apparatus manufactured by TSI® Inc. utilizing the particulates found in ambient air as the challenge medium. Quantification is by optical density measurement using condensation nucleus counting technology. The instrument specifications include detection of particles as small as 0.02 μm in a range of 0.1 to 5 x 10<sup>5</sup> particles/cm<sup>3</sup>.
- 3.3 *Tight fitting facepiece:* Any respirator facepiece that relies on a 'mask to face' seal to provide protection. This class includes quarter, half, and full facepiece masks used in both negative and positive pressure modes in air purifying and supplied air respirators. Excluded from this classification are hoods and helmet style respirators.

#### 4.0 PREREQUISITES

- 4.1 **Calibration of equipment:** Test equipment used in this program will be calibrated on an annual basis by the manufacturer of equipment, or by an equivalent, independent calibration service provider. The IH Group will maintain records for a minimum of three years.
- 4.2 **Fit Testers Qualifications:** Only persons with current qualification can perform the role of *Fit Tester* in this program.
- 4.3 For SHSD personnel, the IH Group Leader or Respiratory Protection Program Administrator shall qualify persons to perform testing under this program. The qualification criteria for a *Fit Tester* are:
  - 4.3.1 An overall knowledge of respiratory protection principles and successful completions of the BNL courses (or equivalent) in APR/PAPR and SCBA,
  - 4.3.2 Successful completion of CPR certification.

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- 4.3.3 Specific knowledge of this procedure, OSHA 29CFR1910.134, *ANSI Z88.2*, and *Z88.10*. This can be gained from work experience or specialized training courses.
- 4.3.4 Demonstrated competency in performing this test to the satisfaction of the IH Group Leader or Respiratory Protection Program Administrator via:
  - Visual observation of the fit test technique using the fit test apparatus and the ability to assemble the respiratory protective equipment.
  - Demonstrated knowledge in the types of respiratory protective equipment used at BNL.
  - Demonstrated knowledge in respirator cleaning technique.
- 4.3.5 The SHSD IH Group Leader will transfer the names of SHSD persons who have passed the competency tests for *Fit Tester* to the BNL BTMS Administrator for inclusion in that database. *Fit Tester* personnel shall be re-qualified at a frequency not to exceed three years. See form in Attachment 8.1 *Qualification Documentation for QNFT Fit Tester*.
- 4.4 For non-SHSD personnel conducting fit testing, the *Fit Tester's* line management shall establish qualification criteria that are compliant with ANSI and OSHA drivers and shall qualify persons to perform fit testing under this program.
- 4.5 **Persons being fit tested:** Only persons who have documented records of compliance with the Respiratory Protection Program requirements for OMC Respirator Protocol and BNL Office of Training and Qualification (OTQ) training (or BNL Respiratory Protection Program Administrator approved equivalent) for the type of mask being fitted are allowed to be fit tested. It is the role of the fit tester to verify compliance with the Respiratory Protection Program requirements <u>prior to</u> commencing the fit test by examining the BNL Respirator Authorization Card or accessing the employee's records in the Brookhaven Training Management System (BTMS). Acceptable OMC and Training status are:

IND317 Fit Test	Training	OMC Approval
to be Conducted	12 month cycle	18 month cycle
Half face- APR/PAPR	IND-301/301W	Half-Mask Air Purifying Respirator
HP-IND-317D North 7700-Half Mask		
Full Face- APR/PAPR	IND-301/301W	Full-Face Air Purifying Respirator
HP-IND-317C North 7600-FF		
HP-IND-317C North7800-PAPR FF		
HP-IND-317E North FullFace		
HP-IND-317F Racal PAPR Full Face		
HP-IND-317B MSA Ultra View APR		

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IND317 Fit Test to be Conducted	Training 12 month cycle	OMC Approval 18 month cycle
Full Face- Supplied Airline	RPPA approved record	Air-Line Respirator ( mask/ hood and hoses )
SCBA HP-IND-317A Cairns SCBA	IND-309	Self-Contained Breathing Apparatus
Avon Military Mask HP-IND-317H	SSD training record	Full-Face Air Purifying Respirator

#### **5.0 PRECAUTIONS**

- 5.1 Equipment Contamination: It is possible that some individuals may have an undiagnosed contagious disease that could be transmitted from person to person by close contact with face-pieces if the equipment is not properly sanitized between users. In all cases, personal protective equipment owned by the IH Group that is used for fit testing must be thoroughly sanitized between wearers following procedures set up in the SOP IH72450.
- 5.2 <u>Fit testers are not authorized to conduct fit testing on persons with diagnosed, contagious infectious diseases.</u>
- 5.3 **Personal Protective Equipment (PPE) for fit tester**: The operation of the fit test equipment does not expose the fit tester to any hazard. Personal protective equipment is not required.
- 5.4 **Hazard Determination:** The operation of fit test equipment does not cause exposure to any chemical, physical, or radiological hazards. The equipment does not generate Hazardous Waste.

#### 6.0 PROCEDURE

- 6.1 **Equipment:** 
  - 6.1.1 TSI® Portacount™ Respirator Fit Tester, or equivalent..
  - 6.1.2 Appropriate respirators- probed for fit testing.
  - 6.1.3 HEPA filter cartridges for above respirators.
  - 6.1.4 Authorization Cards, laminating pouches (GBC 3202105 from Corporate Express)
- 6.2 **Pre-Test Qualification**: Verify that the person to be tested is in compliance with the Respiratory Protection Program Medical Approval and Training requirements prior to

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commencing the fit test. This can be done by examining the person's BNL Respirator Authorization Card or by accessing the employee's records in the Brookhaven Training Management System (BTMS).

- 6.3 **Screening**: Observe that the worker does not have any disqualifying conditions. As per OSHA 29CFR1910.134 Appendix A, do not perform a fit test on anyone:
  - 6.3.1 With any hair growth between the skin and facepiece seal surface. This includes stubble beard growth, beards, moustaches, or sideburns that cross the respirator seal surface.
  - 6.3.2 Exhibiting difficulty in breathing during the tests or who otherwise demonstrates signs of medical impairment caused by the test.
- 6.4 **User Instruction:** Instruct the user on proper techniques for donning and fitting the respirator, including:
  - 6.4.1 Initial inspection,
  - 6.4.2 Cartridge/canister installation (if applicable),
  - 6.4.3 Donning, positioning, and adjusting the mask,
  - 6.4.4 Leak check procedures,
  - 6.4.5 QNFT test protocol and tests with a demonstration of each exercise.
- 6.5 **Selection of mask:** Select the respirator to be fit tested based on the type indicated on the *Employee Respirator Medical Approval Form* (i.e. half face, full face, SCBA, Avon, etc). See Attachment 8.4. Allow the user to try on respirators from available sizes and choose the respirator that is most comfortable and passes the leak check tests. If the preferred manufacturer model fails to provide a passing fit test, attempt a fit test from at least one other model or vendor in appropriate style. Ensure that the respirator selected is acceptable and comfortable to the worker.
- 6.6 **Leak Checks:** Have the user perform a positive and where possible a negative pressure leak check on the mask.
  - 6.6.1 Negative pressure leak check: Have the user seal the inlet valve(s) to the respirator by covering the exposed face of the cartridges or removing the cartridges and covering the openings with the palm of the hand. Have the user inhale and verify that the mask contracts slightly inward before leakage occurs.
  - 6.6.2 <u>Positive Pressure leak check:</u> Have the user seal the exhalation valve(s) of the respirator with the palm of the hand and blow gently into mask. Verify that the mask expands slightly outward before leakage occurs.

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- 6.7 **Familiarization Period:** Allow the user to wear the mask for a familiarization period of at least five minutes prior to the fit test. If the mask becomes uncomfortable during that period, allow the user to select another mask and repeat the leak checks and familiarization period.
- 6.8 **Facepiece set-up:** Use either a surrogate facepiece having a sealing surface and material of construction that are the same as the wearer's facepiece in the workplace, or use the wearer's individually assigned facepiece. Tight fitting positive pressure respirator facepieces are to be fit tested only in the negative-pressure mode regardless of the mode of operation in use.
- 6.9 **Fit test and Exercise regimen:** Following the appropriate Fit Test Apparatus procedure for start up, validation, and operation. Have the worker complete a regimen of exercises that at the minimum include sixty seconds of the following exercises:
  - Normal breathing
  - Deep breathing
  - Side to side head movement
  - Up and down head movement
  - Talking- counting backwards from 100, reciting the alphabet, Rainbow Passage, etc.
  - Grimace- smiling or frowning (15 seconds only)
  - Bending over
  - Normal breathing
- 6.10 **Calculation of Fit Test Factor:** Via the automated calculation of the Portacount Plus or by the following formulae, determine the fit factor:

Fit Factor (FF) = Concentration outside the mask Concentration inside the mask.

Overall Fit Factor =  $N / 1/FF_1 + 1/FF_2... 1/FF_N$ 

Where:

N = number of exercises

 $FF_1$  = fit factor on the first exercise

 $FF_2 \ = fit \ factor \ on \ the \ second \ exercise$ 

 $FF_N$  = fit factor on the  $N^{th}$  exercise

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#### 6.11 Determine Passing Test based on BNL Fit Factor Criteria:

- ANSI Z88.2 sets the fit factor to be at least 10 times greater than the Assigned Protection Factor and at a minimum of at least 100.
- OSHA 29CFR1910.134 requires the fit factor to be at least 100 for tight fitting HALF face, and equal to or greater than 500 for tight fitting FULL face.
- BNL policy shall require the fit test to meet the following fit test factor in order to pass based on the following table:

Mask Type	Required Fit Test Factor
APR- Half Face North 7700-Half Mask	500
APR- Full Face MSA Ultra View APR North 7600 Wilson F-710-FF Full Face APR	1000
PAPR- Half Face	500
PAPR- Full Face North 7600-FF/7800-PAPR Racal PAPR Full Face	1000
SCBA Pressure Demand- Full Face Cairns SCBA Full Face	1000
Airline, Demand, Full Face	1000
Airline, Continuous flow, Full Face	1000
Airline, hood or helmet	N/A
Airline, loose fitting facepiece	N/A
Military Mask M-17 Gas Mask Avon F-12 Gas Mask	1000

(a) NIOSH Respirator Decision Logic Publication 97-108. & NIOSH Pocket Guide to Chemical Hazards (2002 Web) (b) ANSI Z88.2-1992. (c) OSHA 29CFR1910.134

6.12 Printout the fit test record from the automated system. Explain the results to the employee and obtain the fit testers and workers signature. Save the test results to computer memory.

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File the record under the employee's name. The IH Group will maintain the hardcopy records of the fit test for a minimum of three years.

- 6.13 Complete a *BNL F2287A*, *Respirator Authorization Card*, laminate, and give it to the worker. See Attachment 8.3.
- 6.14 Complete the record of the testing (*Fit Test Completion Record*) form contained in Attachment 8.4 of this SOP, copy, and send the original to the BNL Training and Qualification Program Office.
- 6.15 SHSD fit test records should contain at a minimum the following information: Type of fit test and the fit test apparatus used, instrument calibration and repair, name of person conducting the fit test, specific make, model and size of respiratory protective devise, name of person tested, date of test, results of fit test, success or failure, any special considerations or difficulties in wearing (contact lenses, glasses, etc).

#### 7.0 REFERENCES

- 7.1 OSHA 29CFR1910.134 (Respiratory Protection)
- 7.2 ANSI Z88.2. (American National Standard for Respiratory Protection).
- 7.3 ANSI Z88.10 (Respirator Fit Testing Methods)
- 7.4 BNL SHSD Procedures: IH72200, 73350, 72360, IH72450.

#### 8.0 <u>ATTACHMENTS</u>

- 8.1 Qualification Documentation for QNFT Fit Tester
- 8.2 Sample of Printed Documentation of Fit Test Record
- 8.3 BNL F2287A, BNL Respirator Authorization Card
- 8.4 Sample of *OMC Medical Approval form*
- 8.5 Training & Qualifications Program Office Fit Test Completion Record

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#### 9.0 <u>Documentation</u>

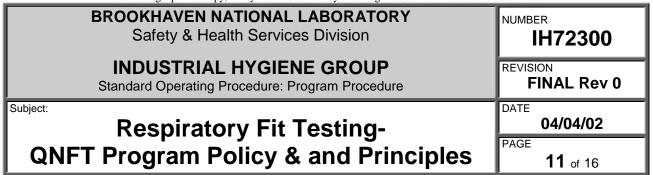
Document Review Tracking Sheet	
Reviewed By / Date: (signature/date on file) D. Wadman 04/03/02 SHSD respirator Fit Tester Lead	Approved By / Date: (signature/date on file) R. Selvey 04/03/02 Industrial Hygienist Group Leader
QA Review / Date:	Effective Date: 04/04/02
	Reviewed By / Date: (signature/date on file) D. Wadman 04/03/02 SHSD respirator Fit Tester Lead

Periodic	Review Record (1 year	ar cycle)
Date of Review	Reviewer Signature and Date	Comments Attached

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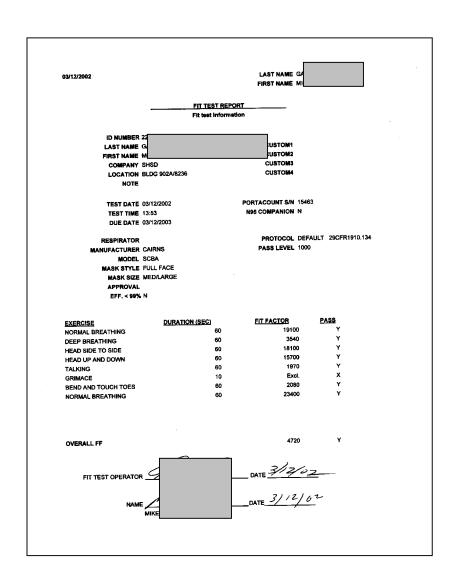
## Attachment 8.1 Qualification Documentation for **QNFT Fit Tester**

#### (Name of employee and BNL Life#) Identification of person being qualified Activities qualified to Fit Tester for testing the mask to face fit of respiratory perform protection equipment OSHA 20CFR1910.134 and ANSI Z88.2 protocols. Basis used for Course: [School and Date] certification (education, Experience at BNL using SOP IH72300 and Apparatus SOP experience, indoctrination, and CPR Qualified \_\_APR trained \_\_\_SCBA trained training) Test results (where applicable): Not applicable Results of capability Observed performing the testing procedure accurately demonstration: Observed cleaning equipment accurately Results of physical Not required examinations Signature of [Name of person performing the qualification, Title] employer's designated representative Date of Certification (date) Date of Expiration (date) 36 months



#### Attachment 8.2

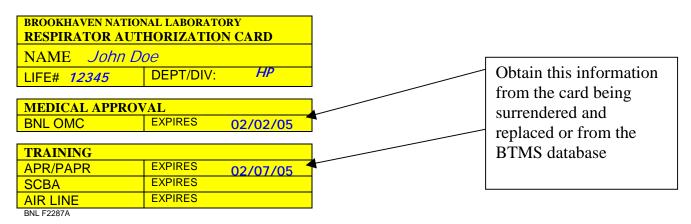
#### Sample of Printed Documentation of Fit Test Record



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### Attachment 8.3 BNL F2287A, BNL Respirator Authorization Card

#### FRONT OF CARD



#### BACK OF CARD

MFGR / STYLE  NORTH 7700 HALF  NORTH 7600 FULL  CAIRNS FULL FACE  MSA FULL FACE	SIZE	EXPIRES 02/02/05 ◀ 02/07/05
RESTRICTIONS OTHER	<u>X</u> EYE	GLASSES

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Attachment 8.4

Sample of OMC Medical Approval form

(See next pages)

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Attachment 8.5

## TRAINING & QUALIFICATIONS PROGRAM OFFICE FIT TEST COMPLETION RECORD

(See next pages)

### Brookhaven National Laboratory Respiratory Protection Program Record BNL Employee Respirator Medical Approval Form

This form should be completed and available to the examining physician at the Occupational Medicine Clinic (OMC) at the time of your medical evaluation for respirator use.

Employee Last Name	2:		First Name:		
Life No:	Dept./Div.		Building No:	Extension:	
	Types, approximate weights	of respirator, and res	piratory working condi	tions for this employee	
Self-Con	tained Breathing Apparatus	(20 Lbs	.) Full-Fac	ee Air Purifying Respirator	(2 – 3 Lbs.)
Air-Line	Respirator ( mask/ hood and	d hoses ) (9 Lbs.)	Half-Ma	ask Air Purifying Respirator	(0.75 Lb.)
Powered	Air Purifying Respirator	(5 Lbs.)	Escape 1	Pack (3 Bottle Unit )	(16 Lbs.)
Duration and freq	uency of respirator use:	Hours per Da	ay Days pe	r Week Weeks 1	oer Year
Expected physica	l work effort:	ight Mode	rate Strenuo	us Very St	renuous
Potential for Heat	Stress: Maxim	um Expected Temp	F C	Maximum Expected H	umidity (%)
	blocks indicate the type irator to fit test the				
Additio person		worn or carried			
Res		isual Activities	Distant Visual A	Activities Spectacle	Kit Needed
BNL Supervisor			FS Rep.		
<u> </u>	Printed Name	Mail		Printed Name	Mail
ES&H Coordinator	D: . IN		G:		
	Printed Name		Signature	Date	Mail
	-		ipational Medicine Cl	inic (OMC):	
<u> </u>	or use approved without limit				
	have been medically qualific evaluation is required for 18 r				nchever occurs
Respira	tor use approved with limitat	tions (checks or comp	lete any that apply).		
	Respirator approval only th	rough (specify date):			CN 1' 1
Employee approved for specific respirator and/or conditions, as follows  This is the date of Medical Approval, add 18 months an enter on authorization Card					
Not approved for res	pirator use:	Until further notice	Until (specify d	OMC expiration	
Employee sl	nould return to OMC on		for re-eval	uation of respirator approval	status.
	This page shou	ıld contain <u>NO</u> p	ersonal medical in	nformation	
OMC Physician	Signature			Date	
	Digitature			Date	
	on file in OMC medical recor	d		nailed to Facility Support Re	
	en to employee Office of Training and Qualifi	cations (Bldg.703)		nailed to ES&H Coordinator oFit Test Office (Bldg. 129)	
	ational Laboratory Occupation			, ,	



### TRAINING & QUALIFICATIONS PROGRAM OFFICE FIT TEST COMPLETION RECORD

Send to: Training, Bldg. 703, or Fax to 8283

Course Number: HP-IND-317 (A thru I)	Course Name: Respirator Fit Testing
Date:	<b>Operator</b> (s):

	First Name (print)	Last Name (print)	Life/Guest Contractor #	Dept/Div	Select Respirator from List Below (enter A thru I)	Medical Date OM-MEDSURV-RESP
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						

#### Respirator Fit Testing Entry Codes HP-IND-317A Fit Test Cairns SCBA Full Face [1000] HP-IND-317B MSA Ultra View APR [1000] HP-IND-317C North 7600-FF/7800-PAPR Full Face [1000] HP-IND-317D North 7700-Half Mask [500] HP-IND-317E North HEPA Filter [1000] HP-IND-317F Racal PAPR Full Face [1000] HP-IND-317G Wilson F-710-FF full Face APR [1000] HP-IND-317H Avon F-12 Gas Mask MSA M-17 Gas Mask [500] HP-IND-317I